2104 Annual Report
Derek R. Lovley
University of Massachusetts
Grant Number: N000141310549
Title: Rewiring a Microbial Chassis to Optimize Electrosynthesis

Scientific and Technical Objectives

The overall long-term objective of these studies is to develop a chassis microbe for high-rate microbial electrosynthesis, significantly improving the electrical contacts with cathodes and long-range electron transport through cathode biofilms. The research aims to be accomplished in this proposal are to 1) identify the "bioelectrical plugs" for establishing direct cell-electrode electrical contacts for electron transfer into cells in a potential gram-positive (*Clostridium ljungdahlii*) and gram-negative (*Geobacter sulfurreducens*) chassis for electrosynthesis; 2) determine the "biocircuitry" required to establish long-range electron transport through cathode biofilms; and 3) combine discoveries from Aims #1 and #2 to rewire a chassis for enhanced cathode-to-cell electron transfer.

Approach

(b) (4)

Concise Accomplishments

(b) (4)

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Expanded Accomplishments

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Work Plan

(b) (4)

(b) (4)

Major Problems/Issues
None

Technology Transfer
A collaboration has been established with LanzaTech (http://www.lanzatech.com/) to further develop microbial electrosynthesis through improve reactor and strain design.

Foreign Collaborations and Supported Foreign Nationals
(b)(6)

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Productivity

Peer-Reivewed Publications
Malvankar NS, Lovley DR. 2014. Microbial nanowires for bioenergy applications. Curr Opin. Biotechnol. 27:88-95.

Presentations at Scientific Meetings (* indicates invited talk)

*Synthetic Electromicrobiology. North American Meeting of the International Society for Microbial Electrochemical Technologies. Penn State University. May 2014.

Multiple invitations to present keynote addresses at international meetings were declined due to personal restrictions on travel by the PI in this year.

Awards
Lovley: “Highly Cited Researcher 2014” -Thomson Reuters

Award Participants
Derek Lovley
Kelly Nevin
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